111721

Proposed Plan

July 1989

US EPA
Region III

Havertown PCP
Haverford Township
Delaware County
Pennsylvania

INTRODUCTION

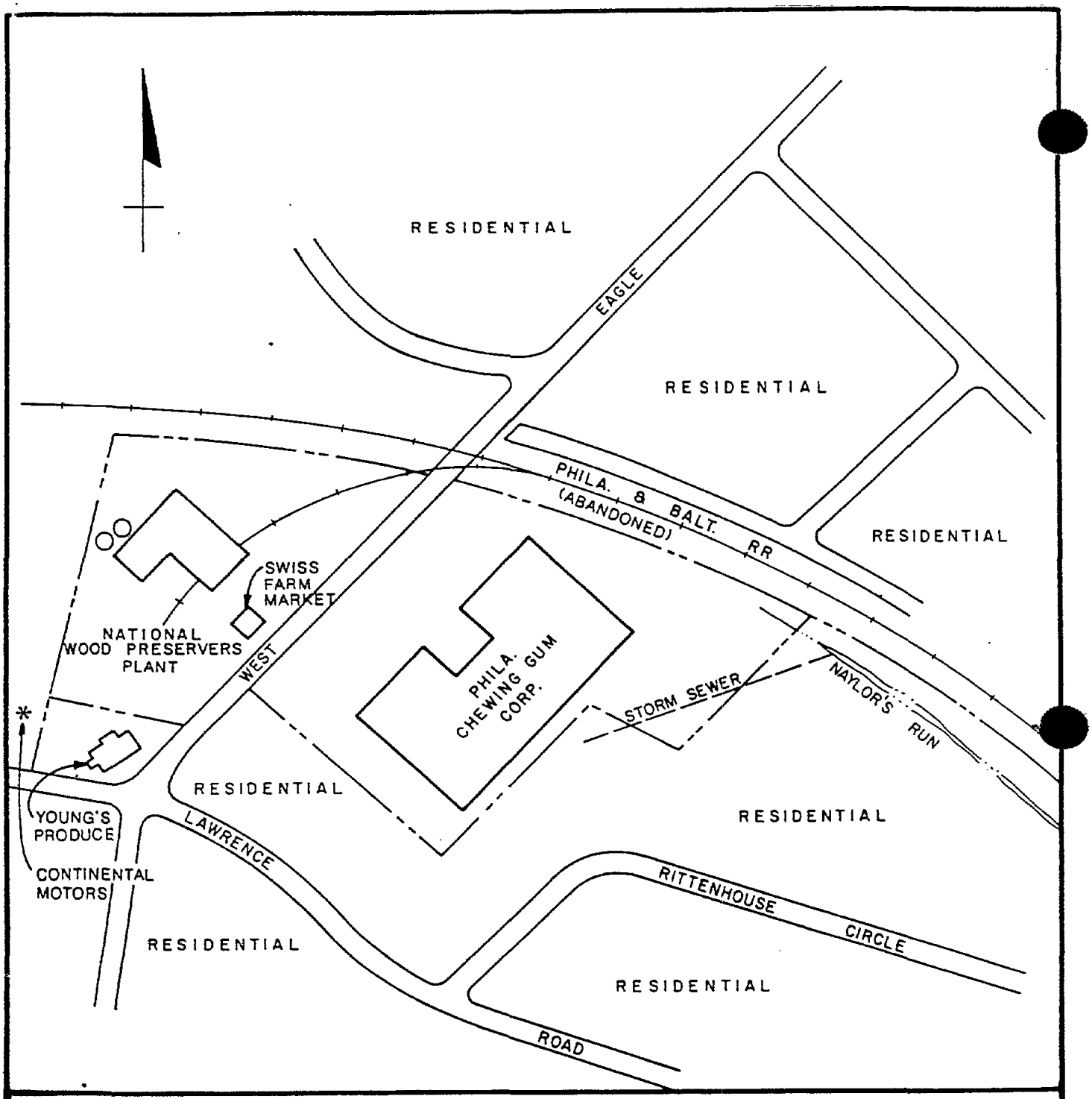
In 1980, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), now known as Superfund, was enacted to provide Federal authority and funding to respond to abandoned or uncontrolled hazardous waste sites that posed actual or potential threats to human health or the environment. CERCLA gave the U.S. Environmental Protection Agency (EPA) the primary responsibility for enforcement and remediation activities which must be conducted according to the National Oil and Hazardous Substances Contingency Plan (NCP) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) guidelines. To be eligible for long-term Superfund remediation, sites must be identified on the National Priorities List (NPL), a list of the nation's most serious hazardous waste sites.

SITE DESCRIPTION

The Havertown PCP site is a State-lead site and is located in Havertown, Haverford Township, Delaware County, in southeastern Pennsylvania. The site is located approximately 10 miles west of Philadelphia and is surrounded by a mixture of commercial establishments, industrial companies, parks, schools, and private homes.

The investigated area comprises of a wood-treatment facility operated by National Wood Preserver (NWP); the Philadelphia Chewing Gum Company (PCG) manufacturing plant adjacent to the wood-treatment facility: Naylors Run, a creek that drains the area; and neighboring residential and commercial properties (Figure 1).

The entire Havertown PCP site is of approximately 12 to 15 acres roughly delineated by Lawrence Road and Rittenhouse Circle to the south, the former Penn Central Railroad tracks to the north, and the fence between NWP and Continental Motors to the west. There is no distinct boundary to the east. NWP, the source of the contamination, is the focus of this investigation. Structures on the property include a sheet metal building with aboveground chemical storage tanks situated on a 2-acre property just north of the intersection of Eagle and Lawrence Roads and the large PCG bubble-gum production building.



200' 0 200'

SCALE IN FEET

FIGURE 1

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HAVERTOWN PCP SITE

HAVERTOWN, PA

STUDY AREA MAP

drawn	approved	drawing no.
CCS	JNW	86021-013-AA
checked JST	date 4-22-88	

r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

The entire Havertown PCP site is drained by Naylors Run, a creek that flows in a southeasterly direction from the site. For the most part, surface runoff across the NWP site enters artificial drainage channels before discharging into Naylors Run. On the NWP property a significant amount of water accumulates in the area of the gate for pedestrians gate near Continental Motors and in the vicinity of NWP's main gate near Eagle Road. Under storm event conditions, the large amount of sheet flow that occurs on NWP property in the area of the main gate empties into the drainage ditch bordering the north edge of the property. Naylors Run flows through natural channels, concrete-lined channels, and a variety of pipes before entering Cobbs Creek near East Lansdowne, approximately 4 miles southeast of the site. Cobbs Creek joins Darby Creek, which flows through the Tinicum Wildlife Preserve before entering the Delaware River.

SITE HISTORY

The NWP site was first developed as a railroad storage yard and later became a lumberyard. In 1947 the wood-preserving facility was constructed and operated by Mr. Samuel T. Jacoby. In 1963 the existing facility was purchased by the Goldstein family.

The facility has not changed significantly since its construction and today consists of a single sheet metal building, which contains the wood-treatment equipment, and several chemical storage tanks located immediately northwest of the building. The production facility is surrounded by a dirt-covered storage yard in which untreated and treated wood are stored. The entire NWP facility is enclosed by a chain-link fence. In 1963-1964 the Goldsteins made some basic chemical containment and chemical recycling modifications to the facility at the request of The Pennsylvania Department of Environmental Resources (PADER).

Two wood-treating processes have been used at this facility: the "empty-cell-pressure treatment process" and the "non-pressure dip treatment." The facility has three pressure treatment cylinders, two inside the building and one outside. Pressure-treated wood was air dried on drip tracks and stored on-site. Wood that was dipped into treatment solutions was similarly dried and handled.

The primary contaminants of concern that occurred as a result of wood-treatment operations at NWP are PCP, chlorinated dioxins and dibenzofurans, fuel oil and mineral spirits components, heavy metals, certain volatile organic compounds, and phenols. All these materials are primary constituents or impurities of the various wood-treatment solutions used at NWP since operation began in 1947.

ANALYTICAL DATA

The July, 1989 Focused Feasibility Study prepared for the Pennsylvania Department of Environmental Resource (PADER) by Lawler, Matusky and Skelly Engineers, Pearl River, New York addressed three areas of concern: onsite soils, contaminated waste in tanks and drums stored on National Wood Perserver's property, and water and air releases at Naylors Run. Groundwater was not addressed in this study.

Soil sampling at the NWP plant site revealed significant concentrations of fuel oil and PCP widely distributed across the site. Other BNAs, metals, dioxins, and dibenzofurans were also identified. Soils in the tank area (Figure 2) had the highest detected levels of metals, BNAs (including PCPs), oil and grease, dioxins, and dibenzofurans.

The chemicals detected in surface water samples included PCP, naphthalene, benzene, toluene, xylene, and phenanthrene. Concentrations of these chemicals were not detected in surface water samples, where the floating oil believed to be associated with the NWP facility was not present. The concentrations of pesticides and PCBs were below detection levels in all surface water samples. The toxicity equivalent factors (TEF) for total tetra- through octa-chlorinated dibenzodioxins and dibenzofurans in all surface water samples were less than 1 ppt (0.033 to 0.164 ppt). Contamination in the samples collected above the storm sewer outlet consisted mainly of various heavy metals. The presence of arsenic, zinc, and copper may be associated with NWP because these metals are used in the wood-treatment process at the site.

Analytical results show that the sediments generally have higher levels of contaminants than the surface water. Several BNAs were found at elevated levels in all sediment samples. Total BNAs ranged from 221,000 to 6500 ug/kg in Naylors Run. PCP levels in samples collected below the outfall decreased from 2300 ug/kg at SED-4 (Figure 3) to 120 ug/kg at SED-1 downstream. The highest level of PCP in sediment was 8700 ug/kg at SED-10. Total concentrations of metals were higher in the sediments than in surface water samples. Chromium, a wood preservative, was found at 40 ug/kg. No PCBs, dioxins, or dibenzofurans were found above detection limits.

There are five holding tanks of contaminated water and over 100 drums of waste materials in a storage area northeast of the NWP building. The two 2500-gal. tanks and three 500-gal. tanks on-site contain contaminated water. The oil and grease concentrations in the water are less than 5 mg/l. PCP concentration is high, about 11,000 ug/l. Toluene (up to 212 ug/l) and trichloroethene (2 ug/l) were also found in the tank water.

RISK ASSESSMENT

An evaluation of the contaminants present in each medium of the Havertown PCP site was prepared by Greeley-Polhemus Group, Inc. (June, 1989) for PADER. It addresses on-site soils and air, groundwater, Naylors Run surface water, sediments in Naylors Run, and sediments in an on-site drainage ditch. The chemicals were ranked in accordance with their toxicity-concentration (TC) values. These values were summed for all media to obtain an indicator score (IS), and the chemicals were ordered in accordance with their IS values. Carcinogens were ranked separately from noncarcinogens. Six indicator chemicals were selected: arsenic, benzene, benzo(a)anthracene, benzo(a)pyrene, chromium VI, and 2,3,7,8-TCDD equivalents.

The arsenic and chromium probably come from the chromated copper arsenate used in the wood-preserving operations. The benzene, benzo(a)anthracene, and benzo(a)pyrene probably are contaminants in the PCP.

In addition to these indicator chemicals, all other chemicals detected on-site and in the area that could potentially cause human health effects were evaluated. These included PCP, several metals (antimony, beryllium, copper, lead, mercury, nickel, silver, and zinc), several VOCs (chloroform, chloroethylene, dichloromethane, dichloroethylene, tetrachloroethylene, and trichloroethylene), a phthalate, and three pesticides (chlordane, beta BHC, and dieldrin) that may have been used on-site.

The human health risk in terms of the maximum potential risk of contracting cancer relative to the distance from the source from inhalation or ingestion was calculated for each potentially carcinogenic chemical. The results, expressed in terms of risk per million people exposed, are as follows:

1. Inhalation of entrained particulates containing chromium VI, arsenic, and other metals from on-site soils and of VOCs emanating from the site by persons off site:

	DISTANCE FROM THE SITE				
	500 ft	1000 ft	1320 ft	2000 ft	2640 ft
Cancer risk (per million)	5.8	2.9	2.2	1.45	1.1

These values are considered to be higher than the actual risk because the analytical results for total chromium was used as if it were 100% hexavalent chromium.

2. Inhalation of benzene and other VOCs at the nearest residences (two within 75 meter or 250 ft) to the underflow dam: 5.5 (per million)

3. Ingestion of on-site soils: 8 (per million) This value is considered to be higher than the actual risk because the analytical results for total chromium were used as if it were 100% hexavalent chromium.

4. Ingestion of sediments from Naylors Run: 7 (per million). This value is probably higher, since samples were collected prior to the construction of the catch basin on Naylors Run.

5. Ingestion of sediments from the on-site drainage ditch: 1 (per million)

6. Ingestion of liquids from the underflow dam: 2 (per million)

7. The total risk from all sources for a person living within 500 ft of the site and within 250 ft of the underflow dam and ingesting the on-site soils and sediments, the sediments under Naylors Run, and the liquids in the underflow dam is not cumulative; however, or multiple exposures to different mediums a slightly higher risk may be possible.

It should also be noted that none of the noncarcinogens or the noncarcinogenic effects were calculated to be such that the acceptable daily intake (ADI) for any chemical was exceeded for any identified exposure.

REMEDIAL ACTION OBJECTIVES

Onsite Soils:

The remediation objective for the contaminated soils on-site (including the swale) is to __

- o prevent wind entrainment of and access to the contaminants in excess of safe levels; and

- o decrease the permeability of the soils to VOCs if necessary.

Surface Water:

The remediation objective for the surface water is to __

- o reduce PCP oil discharge to Naylors Run to less than 5 mg/l.

- o reduce the concentration of benzene and other VOCs by 17%.

Drummed Waste Materials:

- o The remediation objective for the contaminated waste is to dispose of all materials in a safe and approved method.

Sediments:

Remediation alternatives for the sediments are not addressed here because no data exists after the installation of the catch basin by EPA in 1988. In 1987, before installation of the catch basin, sediment samples were collected from nine locations in Naylors Run. The samples were found to be contaminated with arsenic, chromium VI, benzo(a)anthracene, benzo(a)pyrene, PCP, and dioxins. Based on these data and the limited analyses of samples collected in 1988, the sediments are judged to present a potential health exposure. Potential health risk due to the public's exposure to sediments from Naylor's Run will be assessed following additional sampling.

DESCRIPTION OF ALTERNATIVES

The alternatives discussed below were determined to be both appropriate responses to conditions at the site and protective of the public's health and the environment. They were developed by combining feasible and applicable technologies based on their potential application within specified remediation scenarios. The alternatives are developed separately for each area of concern (contaminated soil on the NWP site, liquids at the catch basin in Naylors Run, and contaminated waste from tanks and drums).

The alternatives are evaluated using the criteria of effectiveness, implementability, and cost. The evaluation typically focuses on effectiveness factors; implementability primarily evaluates the institutional aspects of the combined technologies; the cost evaluation is only a relative assessment of the capital and O&M costs.

REMEDIAL ALTERNATIVES FOR CONTAMINATED SOIL ON NWP SITE

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST
1. No action with monitoring	Achieves remedial action objective. Access restrictions do not reduce contamination. Monitoring is useful for documenting conditions. Does not reduce risk by itself. 30-year air and soil monitoring program.	Not applicable	No capital or O&M costs. High monitoring costs. ($750,000)
2. Cap soil with 8-in. reinforced concrete and monitor	Cap is effective, less susceptible to cracking and weathering. Can withstand truck traffic. Does not remove source of contamination.	Easily implemented. Vapor and dust control required. Restriction on future land use.	Moderate capital and low O&M costs. High monitoring costs. ($1,605,600)
3. Cap soil with 5-in. asphalt and monitor	Cap is effective, susceptible to cracking and weathering. Cannot withstand truck traffic. Does not remove source of contamination.	Easily implementable. Vapor and dust control required. Restriction on future land use.	Low capital and O&M costs. High monitoring costs. ($1,442,600)
4. Excavate and landfill	Landfilling is effective and reliable. Excavation is conventional technology. Off-site transport required. Clean backfill required.	Use of permitted transport and disposal facilities required. Vapor and dust control required.	High capital, low O&M costs. Low monitoring costs. ($25,907,200)

REMEDIAL ALTERNATIVES FOR WATER, OIL AND VOLATILE ORGANICS AT NAYLORS RUN CATCH BASIN

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST
1. No action, with monitoring	Does not achieve remedial action objectives.	Not applicable.	No capital* or O&M cost. Moderate monitoring cost. ($275,000)
2. Present system for liquid effluent control and no action for air control	Reduces contaminated oil discharge to Naylors Run, but contaminated VOC emission continues. Does not achieve remedial action objectives.	Easily implemented.	No capital cost;* low O&M cost; moderate monitoring cost. ($546,600)
Optimum oil/water separator	Effective and reliable oil/water separator is a conventional technology.	Readily implemented; permit required for discharge.	Low capital;* moderate O&M and monitoring costs. ($662,000)

* Capital costs include one-time intensive sampling of Naylors Run sediment, water, and biota.

REMEDIAL ALTERNATIVES FOR CONTAMINATED WASTE FROM TANKS AND DRUMS

ALTERNATIVE	EFFECTIVENESS	IMPLEMENTABILITY	COST
1. Landfill of soil and debris; carbon adsorption of aqueous waste	Landfill is effective and reliable disposal; off-site transport required. Carbon adsorption is conventional technology.	Use of permitted transport and disposal facilities required. Vapor and dust control required. Treated water can be discharged to Naylors Run with permit. Must be completed prior to 1990 land ban.	Moderate capital, no O&M costs. ($144,500)
2. Landfill of soil and debris; off-site treatment of aqueous waste	Landfill of debris is only effective alternative; off-site disposal required. Off-site treatment demonstrated as effective.	Use of permitted transport and disposal facilities required. Vapor and dust control required. Must be completed prior to 1990 land ban.	Moderate c[illegible] ital, no O&[illegible] costs. ($161,200)

REMEDIAL ACTION ALTERNATIVE (RAA)

EPA's preferred alternatives for remediation of the Havertown PCP site are alternative #1 for soil, #3 for surface water, and #2 for the disposal of the onsite drums and tanks.

The no-action alternative (#1) for soil achieves the remedial action objectives because the potential threat to the public's health associated with the continued entrainment of contaminated dust and infiltration of contaminants into the environment poses no significant risk to human health.

Since there is no remedial action, capital and O&M costs are low (Table 7) but monitoring costs are high.

- The known concentrations of air contaminants slightly exceeds the Pennsylvania Air Standards (September 27, 1985); however, that assumed that the total chromium, is 100% hexavalent chromium. The State air standard is 8.33 ng/m^3 while the average total chromium in air data was 10.98 ng/m^3. Current literature indicates that the percentage of hexavalent chromium is less than 10% of the total chromium found in the soil. This would mean that the quantity of hexavalent chromium released into the ambient air is significantly below the minimum State requirement. The potential cancer risk for the ingestion of onsite soils (route with highest cancer risk. This risk assumes total chromium is 100% hexavalent) is within the EPA accepted range of 10^{-7} to 10^{-4}.

- The no-action alternative complies with all appropriate criteria for selection as the remedial response for onsite soil contamination.

- Because the site is an ongoing business concern, it is highly unlikely that children will be found playing on the property. Therefore, the possibility of onsite soil ingestion by the public is not considered a probable event.

The recommended alternative for remediation of the storm drain effluent to Naylors Run is the installation and operation of an optimum, oil/water separator (Alternative 3). Such separators, which are commercially available, are used in petroleum distribution and transportation facilities and in a variety of other industrial and military operations. Of the three alternatives, only the oil/water separator complies with ARARs and provides overall, long-term protection to humans (Table 2).

TABLE 1

NO ACTION - CONTAMINATED SOIL ON NWP SITE

A.	CAPITAL COSTS			
	1. Fencing	$ 15,000		
	2. Resampling of onsite soils	65,000		
	3. Contingency (25%) of construction costs	3,800		
	Total Capital Costs			$ 83,800
B.	CONTINUING O&M COST			
	1. Monitoring	$ 65,000	1yr	
	Present worth (8% for 5 years)			$381,328
C.	PRESENT WORTH			$465,000

TABLE 2

OPTIMUM OIL/WATER SEPARATOR
LIQUID EFFLUENT CONTROL AT NAYLORS RUN CATCH BASIN

A. CAPITAL COSTS		
1.	Initial monitoring of sediments, water, and biota	$ 50,000
2.	Oil/water separator, including installation	35,000
3.	Health and safety	2,000
4.	Predesign data acquisition	25,000
5.	Engineering and design (25% of Nos. 2-4)	15,500
6.	Legal and administrative (20% of Nos. 2-4)	12,400
7.	Contingency (25% of Nos. 2-4)	15,500
Total Capital Costs		$155,400
B. CONTINUING O&M COST		
1.	O&M of oil/water separator	$ 30,000/yr
2.	Monitoring of water and sediments	15,000/yr
Total O&M		$ 45,000/yr
Present worth (8% for 30 years)		$506,600
C. PRESENT WORTH		$662,000

Installation of a carbon adsorption air treatment unit is not considered necessary since the oil/water separator is a closed vessel with only a small vent from which VOCs could be released. Also, since the existing risk due to inhalation of organics from the catch basin at the two residences nearest to the basin is based on limited empirical data, it is recommended that the following additional investigations be conducted in the area of the catch basin:

- Measurement of flow volumes from the stormwater pipe draining the NWP site area and in Naylors Run
- Air sampling for VOCs near the catch basin
- Water and oil sampling within the catch basin for PCP, VOCs and other contaminants of concern

The recommended Alternative for cleaning up the contaminated waste staged on site is alternative 2 - landfill of soil and oily debris and off-site treatment of aqueous waste (Table #3). While the two Alternatives evaluated are similar, off-site treatment of the liquid waste is recommended for two reasons:

- It can be implemented more readily; a carbon adsorption unit does not have to be brought on site, effluent testing is not required, and an NPDES permit is not needed.
- Off-site treatment will not require discharging of effluent (albeit treated) to Naylors Run and therefore will be more acceptable to the community.

This proposal is currently undergoing State review.

TABLE 3

LANDFILL AND OFF-SITE TREATMENT of
TANKS AND DRUMS WASTE

A. CAPITAL COSTS		
1.	Sampling, analysis, and labeling of soil and oily debris (200 drums)	$ 30,000
2.	Off-site disposal (landfill) of soil and oily debris	35,000
3.	Sampling and analysis of aqueous waste	5,000
4.	Off-site hauling and treating of aqueous waste (6000 gal @ $4/gal)	24,000
5.	Health and safety	10,000
6.	Engineering and design (10%)	10,400
7.	Legal and administrative (20%)	20,800
8.	Contingency (25%)	26,000
	Total capital costs	161,200
B.	CONTINUING O&M COST	0
C.	PRESENT WORTH	$161,200

PUBLIC PARTICIPATION IN THE RAA SELECTION

EPA considers public participation in the decision making process associated with site remediations to be vital. Consequently, the Agency makes site-related documents available to the public at various location in the community. For this Site, an information repository will be established shortly in a public building in Haverford Township.

Since this is still a State-lead site, the State is required to announce the availability of the Focused Feasibility Study (FFS) Report and to provide a public comment period to allow community members to express their comments and concerns. The comment period for the Havertown PCP Site is expected to begin on August, 1989, and extends until September, 1989.

Comments, inquiries, and requests for additional information may also be made by contacting the following EPA/PADER representatives:

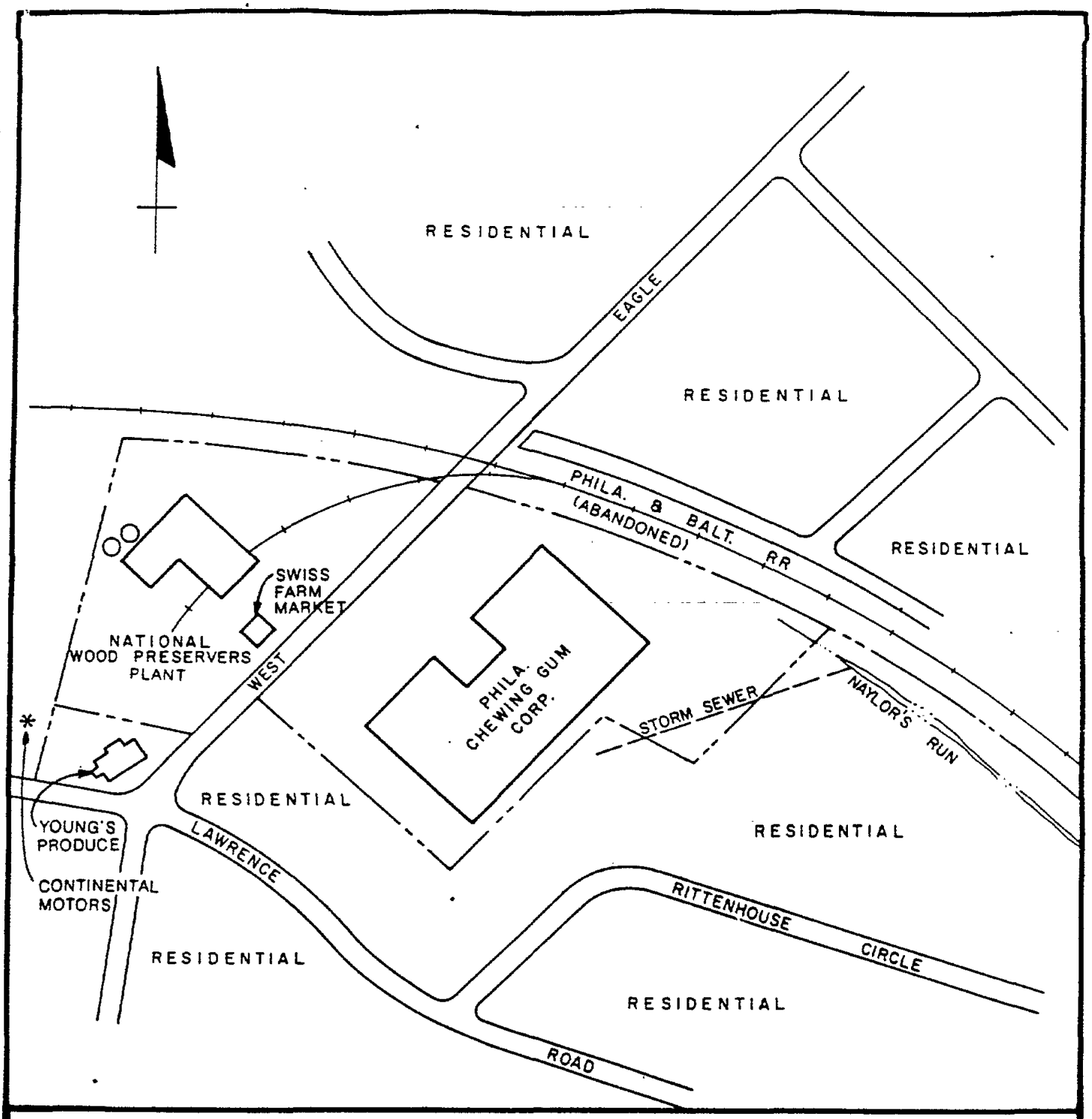
Ms. Nanci Sinclair (3PA00)
Community Relation Coordinator
(215) 597-4164

Mr. Nick DiNardo (3HW22)
Regional Project Manager
(215) 597-8541

US EPA
841 Chestnut Street
Philadelphia, PA 19107

Thomas Leaver
PA Dept. of Environmental Resources
P. O. Box 2063
Harrisburg, PA 17120
(717) 783-7816

Following the public comment period, EPA will make a final determination on remediation activities.



200' 0 200'

SCALE IN FEET

FIGURE 1-3

AR300825

HAVERTOWN PCP SITE
HAVERTOWN, PA

STUDY AREA MAP

drawn CCS	approved JNW	drawing no. 86021-013-AA
checked JST	date 4-22-88	

r. e. wright associates, inc.
earth resources consultants
middletown pennsylvania

Havertown PCP Site
Haverford Township
Delaware County
Pennsylvania

Selected Remedial Alternatives for First Operable Unit:

1) "No Action Alternative" for onsite soils.

2) Oil/Water separator to control effluent at Naylors Run storm drain.

3) Landfill and offsite treatment of tanks and drum wastes generated during Remedial Investigation and subsequent O&M of Naylors' Run catch basin.

National Wood Preservers (NWP)

- Former railroad storage yard, which in 1947 became a wood-preserving facility.

- It was sold in 1963 to it's current owner Harris Goldstein the only known PRP.

- Two wood-preserving processes were used at the site:

    1) "empty cell pressure"
    2) "non-pressure dip"

  Pressure and non-pressure treated wood was air dried on drip racks in an unlined and unconfined area.

- Wood Preservatives used:

    1) from 1947 until 1977/78, PCP suspended in diesel and mineral oil, and fluoro-chrome arsenate phenol were used.

    2) gradually, begining in 1975, chlorinated copper arsenate (CCA) replaced PCP.

    3) also around this same time, chromated zinc chloride and tributyl tin oxide were used as a fire-retardant and antifouling additive.

- In 1963, plant processing modifications began which recycled excess preservatives from the treated wood and contained and recycled leaks during processing.

- Current pressure treatment and pollution control measures at the site installed since 1963 inhibits further environmental contamination.

Remedial Action Objectives

Onsite Soils:

- The remediation objective for the contaminated soils (including the swale) on-site is to prevent wind entrainment of and access to the contaminants in excess of safe levels; and

- decrease the permeability of the soils to VOCs if necessary.

Surface Water:

- Reduce PCP oil discharge to Naylors Run to less than 5 mg/l. Since the highest PCP level found in the floating oil was 2951 mg/l, the highest PCP level expected in the water if the objective is reached would be approximately 17 ug/l PCP; and

- Reduce the concentration of benzene and other VOCs by 17%.

Drummed Waste Materials:

- The remediation objective for the contaminated waste is to dispose of all materials in a safe and approved method.

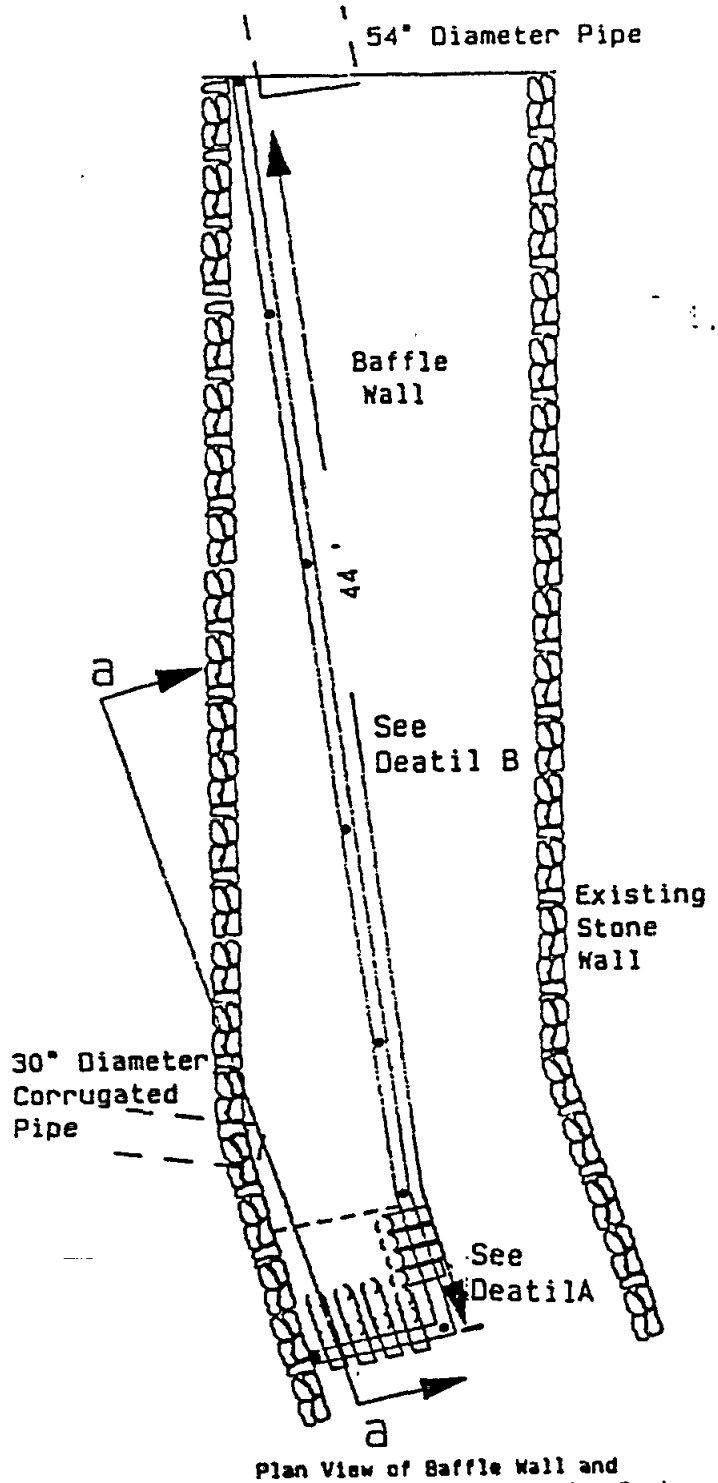
Sediments:

In 1987, before installation of the catch basin, sediment samples were collected from nine locations in Naylors Run. The samples were found to be contaminated with arsenic, chromium VI, benzo(a)anthracene, benzo(a)pyrene, PCP, and dioxins. Based on these data and the limited analyses of samples collected in 1988, the sediments are judged to present a potential health exposure. Remediation alternatives for the sediments are not addressed here because no data exists after the installation of the catch basin by EPA in 1988. Potential health risk due to the public's exposure to sediments from Naylor's Run will be assessed following additional sampling.

TABLE 7

NO ACTION - CONTAMINATED SOIL ON NWP SITE

A.	CAPITAL COSTS			
	1. Fencing	$ 15,000		
	2. Resampling of onsite soils	65,000		
	3. Contingency (25%) of construction costs	3,800		
	Total Capital Costs			$ 83,800
B.	CONTINUING O&M COST			
	1. Monitoring	$ 65,000	1yr	
	Present worth (8% for 5 years)			$381,328
C.	PRESENT WORTH			$465,000



Plan View of Baffle Wall and Underflow Dam/Sedimentation Basin

UNDERFLOW DAM / SEDIMENTATION BASIN
HAVERTOWN PCB SITE
Havertown, Delaware County, PA

ROY F. WESTON, INC.
WESTON MANAGERS DESIGNERS/CONSULTANTS

AR300830

DRAWN	DATE	DES. ENG.	DATE	W. O. NO.
CHECKED		APPROVED		DWG. NO.

TABLE 8

OPTIMUM OIL/WATER SEPARATOR -
LIQUID EFFLUENT CONTROL AT NAYLORS RUN CATCH BASIN

A. CAPITAL COSTS		
1.	Initial monitoring of sediments, water, and biota	$ 50,000
2.	Oil/water separator, including installation	35,000
3.	Health and safety	2,000
4.	Predesign data acquisition	25,000
5.	Engineering and design (25% of Nos. 2-4)	15,500
6.	Legal and administrative (20% of Nos. 2-4)	12,400
7.	Contingency (25% of Nos. 2-4)	15,500
Total Capital Costs		$155,400
B. CONTINUING O&M COST		
1.	O&M of oil/water separator	$ 30,000/yr
2.	Monitoring of water and sediments	15,000/yr
Total O&M		$ 45,000/yr
Present worth (8% for 30 years)		$506,600
C. PRESENT WORTH		$662,000

TABLE 9

LANDFILL OF SOIL AND OILY DEBRIS AND OFF-SITE TREATMENT OF WATER - CONTAMINATED WASTE FROM TANKS AND DRUMS

A. CAPITAL COSTS		
1.	Sampling, analysis, and labeling of soil and oily debris (200 drums)	$ 30,000
2.	Off-site disposal (landfill) of soil and oily debris	35,000
3.	Sampling and analysis of aqueous waste	5,000
4.	Off-site hauling and treating of aqueous waste (6000 gal @ $4/gal)	24,000
5.	Health and safety	10,000
6.	Engineering and design (10%)	10,400
7.	Legal and administrative (20%)	20,800
8.	Contingency (25%)	26,000
	Total capital costs	161,200
B.	CONTINUING O&M COST	0
C.	PRESENT WORTH	$161,200

TABLE 4-2

CAP SOIL WITH REINFORCED CONCRETE - CONTAMINATED SOIL ON NWP SITE

A. CAPITAL COSTS		
1. Preparation of surface cap ($4/yd^2)	$ 40,000	
2. 6-in. gravel subbase (hauling and spreading) ($24/yd^3)	39,000	
3. 8-in. concrete (hauling, spreading, and grading) ($110/yd^3)	235,000	
4. Berm and a paved perimeter drainage ditch ($50/ft)	75,000	
5. Repair and install groundwater monitoring wells	25,000	
6. Health and safety	25,000	
7. Engineering and design (25%)	109,800	
8. Legal and administrative (20%)	87,800	
9. Contingency (25%)	109,800	
Total Capital Costs		$746,400
B. CONTINUING O&M COST		
1. Cap maintenance and repair	$ 5,000/yr	
2. Monitoring	50,000/yr	
Total	$ 55,000/yr	
Present worth (8% for 30 years)		$619,200
C. PRESENT WORTH		$1,365,600

AR300833